THURSDAY, SEPTEMBER 10, 1891.

AN EVOLUTIONARY CASTIGATION.

Science or Romance? By the Rev. John Gerard, S.J. (London: Catholic Truth Society, 1891.)

THAT the doctrine of evolution should not be as sweet savour in the nostrils of the writer of this little book is in no way surprising, but that he should attack evolutionists and their ways with the weapons of flippancy and ridicule is an encouraging indication that the said doctrine has penetrated into quarters from which the author evidently thinks it high time to eject this modern heresy. Having seized the scourge, Father Gerard accordingly proceeds to lay out all round, delivering his blows with vigour, if not with discrimination, and occasionally throwing such force into his strokes that the lash recoils and strikes the striker. In happy unconsciousness that he hits himself quite as often as he does his adversaries, the author goes on with his flagellation through six essays occupying 136 pages of somewhat close print. Although, as we have said, the attitude taken by the author will cause no astonishment, it is very much to be regretted that he has so far put himself out of harmony with the spirit of modern biological thought as to confuse the opinions, speculations, and working hypotheses of individual exponents of evolution with the broad principles of that doctrine. For, however distasteful it may be to Father Gerard, it is an indisputable fact that the acceptance of that doctrine is well-nigh universal, and the question whether evolution is or is not a *modus operandi* in nature, has passed beyond the phase of discussion among scientific thinkers and workers. So far as the author's attacks are directed against evolution as a principle, his weapon is as a bladder of air against the hide of a hippopotamus. It is satisfactory to find, however, that amidst the whizzing of his *flagellum* the author discerns the still small voice of reason :—

> "The one fact given us, is the existence of evidence to show that various species of plants and animals have probably, or possibly, been developed one from another. This, so far as it goes, is matter for scientific treatment; and the theory of evolution, within the limits thus afforded, has a right to be called a scientific hypothesis."

We are grateful for small mercies, and it would be ungracious to inquire too closely into the origin of this concession, but to those who read between the lines it will be apparent that the thirty years' campaign carried on by evolutionists has not been without result, even in the most unpromising fields.

The antagonist whom evolutionists in general and Darwinians in particular have found in the author of the work under consideration is a foeman not altogether unworthy of their steel. He brings into the arena a certain amount of knowledge of living things which indicates that he is an observer of nature in the field. Moreover, he shows some understanding of his subject, and does not fall into the error of substituting blundering misconceptions for the statements of fact or theory which he is combating. Added to this there is a certain keenness of satire running through his essays which adds to their piquancy. The name of Father Gerard on the title-page is a sufficient indication that evolutionists will find death and no quarter in his pages, and the reader will not be disappointed if he turns to these essays with the special object of finding the weaknesses of the modern school exposed. But while the purely destructive attacks of the reverend critic may give satisfaction to those who belong to his school, the impartial reader will derive only amusement, and the man of science will soon perceive that the weapons of attack are not the legitimate implements of scientific warfare, but the tricks of disputation concealed under a somewhat alluring literary cloak, embellished here and there with a few flowers of the author's own culling.

Having arrived at this general estimate of the work, it will not be necessary to do more than take a passing glance at its contents. The first essay, entitled "A Tangled Tale," opens with an attack on natural selection; the author will have none of it; he objects to the term and he denies its efficiency :—

> "It would, in fact, be vastly more likely that we should cast aces three hundred times running, with a pair of unloaded dice, or toss 'tails' two thousand times with an honest coin, than that a development should be handed down by natural selection through ten generations, even if we start with so favourable a supposition as that one-half of the offspring tend to vary in the required direction."

This conclusion is based on a calculation in which the whole principle of selection is ignored!

The central idea of this essay is, that evolutionists have reduced the operations of Nature to "chance," "accident," and so forth. We are told, at the very outset :—

> "The cardinal point of the doctrine they proclaim is, that no purpose operates in Nature, and that the explanation of everything we see is to be found in the mechanical forces of matter."

In order that there may be no misunderstanding as to what the author means by chance, he defines it as "the coincidence of independent phenomena—that is, of phenomena not co-ordinated to an end." By what criterion, may we ask, are "chance" phenomena, as thus defined, to be distinguished from "pre-determined" phenomena? Prof. Huxley's example, quoted from Darwin's "Life and Letters," is critically dealt with, and the author tells us that this is "utterly wide of the mark. The phenomena here described [a storm at sea] end with themselves, they lead to nothing else; nothing follows from them. They are mere effects, and not, so far as we know, a means to obtain a result beyond." The insight which the author appears to have gained into the motive, or want of motive, in nature is really most enviable; the man of science who must perforce arrive at his conclusions by the circuitous roads of observation and experiment can only look with admiring wonder upon a method which is so completely foreign to his philosophy.

This same dummy, chance, is well belaboured throughout; among the slain, after this first tilt, we find not only Prof. Huxley, but Andrew Wilson, Oscar Schmidt, and, above all, Mr. Grant Allen, whose form is so terribly hacked that he appears to have been in the very centre of the fray, if not the chief object of attack.

Tilt the second is headed "Missing Links," and the onslaught begins upon Mr. Wallace, whose work on

"Darwinism" appears to have been published in the interval between the first and second essays. And here—perhaps not altogether disconnected with the appearance of Mr. Wallace's book—we find that the author has executed a series of mental evolutions with such skill that we have to rub our eyes in order to make sure that we have not deceived ourselves as to the position which he has actually taken. For natural selection, which, in the first essay, was considered to be so feeble as to be incapable of carrying on development through ten generations, even with the most favourable assumptions to start with, is now considered to be "as yet but hypothesis, and hypothesis which needs confirmation from fuller inquiry into the facts of the case, just as much as the other hypothesis of the continuity of forms between one species and another." At any rate, we seem to be justified in concluding from this that, as a scientific hypothesis, natural selection ranks with evolution, which, we were told in the first essay, had a right to be so called. The change of front has been very skilfully made, but that there has been a change is evident from the foregoing extracts.

The way in which evidence, which has been hitherto considered as fairly good from the evolutionist's point of view, can be manipulated so as to bear the quite opposite interpretation, is a study in intellectual jugglery which might be worthy of serious attention by certain classes of politicians. The second essay furnishes several examples of such feats. More especially may attention be called to the remarkable way in which the palæontological evidence is thus disposed of, and still more remarkable is the author's Podsnappian dismissal of the embryological evidence. Wallace's later treatment of natural variation is accepted:—

"The variations of form and structure which occur among wild animals—and the same is to be said for plants—are not occasional and minute, but incessant and important. There is clearly an end of the objection . . . based on the supposed infinitesimal character of variations."

But if the reader fondly imagines that this admission brings the author any nearer to Darwinism he will be grievously mistaken. For in this larger and more widely divergent variability Father Gerard sees a "centrifugal tendency" by which "every varying climate and soil and circumstance on the face of the globe should make its own species; or rather there should be no species at all, but a fleeting and evanescent succession of individual forms, like the shapes of clouds in a windy sky." Of course, evidence has to be adduced in disproof of this astonishing result, to which the later study of variability has led us, or rather should have led us. But there is no difficulty at all about this: the house sparrow and the water-crowfoot, we are told, are widely distributed over the face of the globe, and yet retain their specific forms and characters. True; but the instances of cosmopolitan species retaining their distinctness are few and exceptional; we are not told anything about local forms and races, or about "representative species"; we hear nothing about widely distributed species which merge imperceptibly into each other to the utter confusion of those who make species their particular study. Can it be that these facts are inconvenient and "not to be endured"? or has the author discovered some absolute criterion of species? If the latter is the case, he can hardly be congratulated on his definition:—

"It would seem to be simpler and plainer to say that a species is a *permanent group* [italics mine] of plants or animals framed in all particulars after a single type."

Enough has been said about this work to indicate its general tendency: its tone, on the whole, is antagonistic to evolution, but with respect to the special Darwinian form of this theory antagonism but feebly expresses the author's attitude. In each essay, the attack generally centres upon one or two representative writers; *e.g.* the third essay ("The Game of Speculation") dealing with Mr. Wallace, the fourth ("The Empire of Man") with Prof. Huxley, the fifth ("The New Genesis") with Messrs. Grant Allen and Edward Clodd, and the sixth ("The Voices of Babel") with a number of miscellaneous authorities, such as Mr. Herbert Spencer, Mr. Frederic Harrison, the late Prof. W. K. Clifford, and Sir James Stephen, of whom the author makes horrid examples by the very simple expedient of pitting their opinions against each other. From this general view, it will be seen that, so far as science is concerned, the effect of Father Gerard's last production will be practically *nil*. Among certain classes of general readers it may be mischievous, but we do not imagine that the mischief will spread very far. As the criticisms are for the most part destructive, it is impossible to attempt to deal with them in detail in these columns. Where it is possible to glean a vestige of a constructive idea, it will be seen that the main point towards which the author appears to be driving is that the doctrine of evolution—especially in its Darwinian form—is destructive of the notion of preconceived and determinate "plan," *e.g.*:—

"Intrinsic forces working definitely towards one play not indeterminate forces swept hither and thither by external agencies like a cloud of dust, are suggested by the phenomena of nature."

We have become so accustomed to this style of criticism from all kinds of anti-evolutionary writers that it is almost superfluous to attempt to deal with it again. But it may really be asked whether those who are so constantly dinning this idea of a "plan" in nature will now condescend to give us some idea what that plan is. If "intrinsic forces are working definitely towards one plan," surely the author to whom has been permitted this glimpse into the inner sanctuary might enlighten the outer darkness a little by telling us something about the general scheme, or, at any rate, by giving us a notion as to the method by which he has arrived at such an important conclusion. On the other hand, if the author is satisfied that there is such a pre-arranged plan—whether he reveals that plan to the uninitiated or not—I, for one, fail to see how evolution, Darwinian or otherwise, has anything to do with the matter. If Father Gerard has managed to extract from the writings of popular authors, this notion of antagonism between ideas which are not necessarily antagonistic, with these authors must rest the responsibility. It cannot be said that the castigation which he has inflicted is altogether unmerited; there has been a great deal of crude and hasty speculation perpetrated in the name of evolution, and the blows aimed do occasionally tell in the right direction. Had Father Gerard not sacrificed his position by aiming so much at smart writing—had he favoured us with more solid thought instead of endeavouring "to split the ears of the groundlings"—his lucubrations would have received more respectful attention. But satire and cynicism, interspersed with ridicule, are not the best methods for securing consideration from men of science, and it is surprising that the author should have resorted so largely to their use.

R. Meldola.

THE LAWS OF FORCE AND MOTION.

The Laws of Force and Motion. By John Harris (Kuklos). (London: Wertheimer, Lea, and Co., 1890.)

In his preface the author, very rightly, sounds a warning note against the arrogance of Conventional Science, in its tendency to become ultra-conservative, intolerant, and extremely dogmatic.

But Real Science will always welcome and encourage attack and contradiction, feeling sure that Truth will ultimately prevail in the consensus of the majority who have devoted themselves dispassionately to the consideration of the facts in dispute. "Transibunt multi et augebit Scientia."

We presume the author would not ask to be judged with more leniency than he has displayed for the opponents he has singled out; so we may say at once that, after careful winnowing, we have not secured those grains of fact and truth which we were led to expect.

The experimental apparatus described seems carefully constructed and suitable for exact measurements; but does not differ essentially from that employed by Smeaton more than 100 years ago. However, the author assumes the true scientific sceptical spirit, in refusing to accept implicitly the statement of theoretical laws without putting them to the test of practical experimental verification.

Mathematicians will understand the nature of the author's attacks on Conventional Science from the specimen on p. 31:—

> "It would seem that, some time ago, a highly influential party of natural philosophers (Leibnitz, the two Bernoullis, &c.) entertained and supported the idea that the momentum of a moving body varies as the square of the velocity. This idea or conclusion was probably based on an inference, that, since a double velocity of the resistance required four times the force to produce it, four times the momentum must have been imparted to the resistance."

After this wavering as to the meaning of momentum, we are quite prepared to find (p. 60) that the author is of the school who declare that the moon does not rotate.

The author cannot decide between 16·1 or 32·2 for the value of *g* (p. 24); and cannot settle in consequence whether the normal acceleration in a circle is the squared velocity divided by the radius or by the diameter (p. 19).

"Tangential force" is, in the author's opinion, a more correct scientific term to use than "centrifugal force," although he allows that the latter is hallowed by long usage; but in his treatment he enunciates a theorem on p. 21, "The actual lineal ratio of the sine to the arc, when the arc is an octant, is 9 to 10," quoted from his own "Treatise on the Circle and Straight Line"; this makes $\pi = 2\sqrt{2} \div 0{\cdot}9$, a result worth recording by collectors of mathematical curiosities.

We hoped to find something combative in the articles on the Tidal Effect of Lunar Gravitation (p. 57), and on the Moon's Gravitative Influence at the Equatorial Surface of the Earth measured by Pendulum Oscillations (p. 76), considering that even the great Abel went astray in his theory at this point; but our author confines himself to vague generalities.

He would perform a valuable service to Science if he employed his experimental skill in observing the effect of Lunar Gravity on the Seconds Pendulum, as Conventional Science asserts that this effect does not amount to more than a rate of one 200th of a second in the day, although so noticeable in the Tides.

"Some Propositions in Geometry," by the same author, is advertised at the end of the book, whereof the Trisection of the Angle, the Duplication of the Cube, and the Quadrature and Rectification of the Circle, occupy the chief part; but we wonder whether the author has quite settled in his Geometry that the versed sine (or vertical height) is proportional to the chord, in a circle (p. 71). This might have been a misprint, but that the author adds immediately a numerical illustration, by saying that, if the chord is duplicated, the versed sine is also duplicated.

And this homely mode of verifying a law of comparison, by halving or doubling some quantity, and then observing the consequent change in the phenomena, is the single idea we consider worth lifting from the book, for general purposes of convincing argument and illustration of a mathematical law.

A. G. G.

OUR BOOK SHELF.

An Introduction to the Mathematical Theory of Electricity and Magnetism. By W. T. A. Emtage, M.A. (Oxford: Clarendon Press, 1891.)

The want of a text-book especially designed for the use of candidates for examinations in which a knowledge of the more elementary portions of the mathematical theory of electricity and magnetism is demanded has been felt for some time. Though the absence of such a book has caused some inconvenience, we are not at all sure that it has been detrimental to the study of electricity, for hitherto the candidate for a mathematical examination in electricity has been compelled to learn the subject from books such as those of Maxwell, or of Mascart and Joubert, in which electricity is treated as what it really is outside the examination-room—a subject in which mathematics and experiment are closely mixed and mutually helpful: it is to this that, we think, is to be ascribed a good deal of that interest which electricity, above all other subjects, seems to excite in its students. When, however, the analytical parts of the subject are divorced from the experimental, we do not believe they will be found to excite any special enthusiasm, or that the result will be much more interesting than an ordinary text-book for the Mathematical Tripos on, say, hydrostatics.

There is no doubt, however, that there is a demand for a text-book suitable for examination purposes, and this demand will, we think, be well met by the book before us. The scope of the work may be described by saying that it includes nearly all the analytical parts of Maxwell's larger treatise which do not involve analysis higher than the simpler parts of the differential and integral calculus;